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NATIONAL DAM INSPECTION PROGRAM. LAKE SHERIDAN DAM (NDS-ID NUMB--ETC(U)
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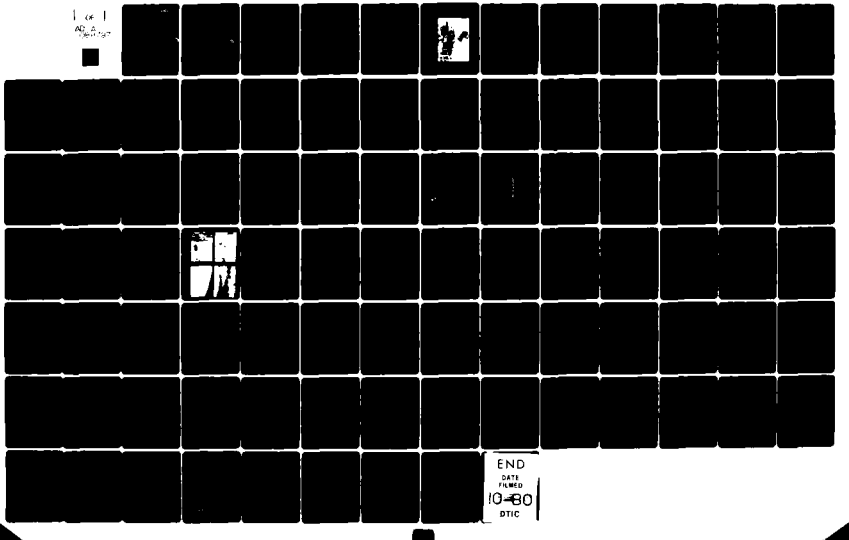

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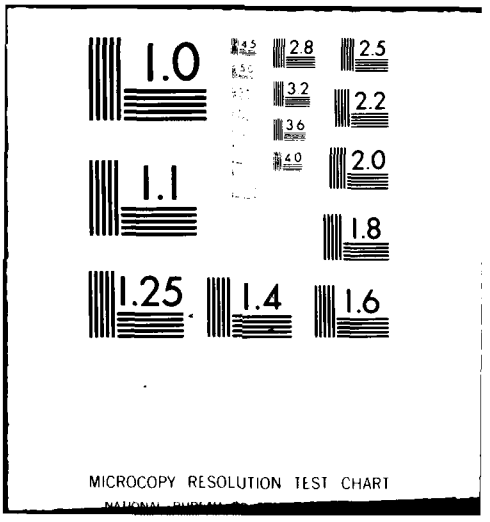
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SUSQUEHANNA RIVER BASIN

LAKE SHERIDAN OUTLET, WYOMING COUNTY

PENNSYLVANIA

LAKE SHERIDAN DAM

NDS ID NO. PA-744

DER ID NO. 66-45

LAKE SHERIDAN COTTAGERS ASSOCIATION

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

DACW31-80-C-0020

Prepared By

L. ROBERT KIMBALL & ASSOCIATES

CONSULTING ENGINEERS & ARCHITECTS

EBENSBURG, PENNSYLVANIA

15931

FOR

DEPARTMENT OF THE ARMY

BALTIMORE DISTRICT CORPS OF ENGINEERS

BALTIMORE, MARYLAND

21203

JULY, 1980

SUSQUEHANNA RIVER BASIN

LAKE SHERIDAN OUTLET, WYOMING COUNTY

PENNSYLVANIA

LAKE SHERIDAN DAM

NDS-ID-NO. PA-744

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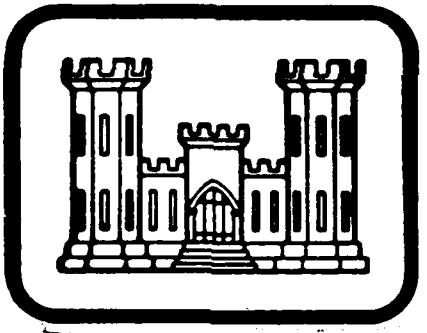

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in detemining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I REPORT
NATIONAL DAM INSPECTION REPORT

NAME OF DAM	Lake Sheridan Dam
STATE LOCATED	Pennsylvania
COUNTY LOCATED	Wyoming
STREAM	Lake Sheridan outlet (unnamed tributary to the south branch of the Tunkhannock Creek)
DATE OF INSPECTION	April 10,1980

ASSESSMENT

The assessment of Lake Sheridan Dam is based upon visual obser- made at the time of inspection, review of available data, hydraulic and hydrologic analysis.

In general, the dam appears to be in good condition. Lake Sheridan Dam is a high hazard-small size dam. The spillway design flood for this dam is the 1/2 PMF to PMF. The spillway design flood was selected as the PMF (probable maximum flood) based on the downstream potential for loss of life and property damage. The spillway is capable of controlling only 2% of the PMF. Based on criteria established by the Corps of Engineers, the spillway is termed inadequate. Since Lake Sheridan Dam's non-overflow section consists of a concrete section over rubble masonry, the non-overflow section should be capable of safely controlling a partial overflow. However, the amount of over- topping that can be safely controlled is unknown. In this case the amount of overtopping is directly related to the structural stability of the dam. No visible seepage or other obvious defi- ciencies affecting the stability of the dam were noted during the inspection.

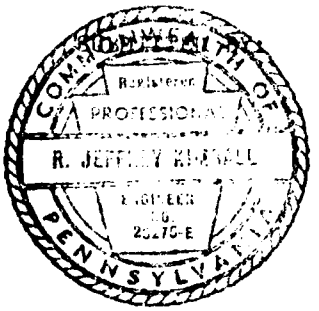
The following recommendations and remedial measures should be instituted immediately.

1. A structural stability analysis should be conducted to determine the amount of overtopping that can be safely controlled by the dam. In the event that the dam cannot safely control the SDF a hydrologic and hydraulic study in conjunction with struc- ture stability analysis should be conducted to increase the spillway capacity. The studies should be conducted by a pro- fessional engineer knowledgeable in dam design.

2. It should be determined if the drainline and valves are operable and in good condition. The valve mechanism for the dam should be operated and lubricated on a regular basis.

3. An investigation should be conducted to determine if a warning system for this dam is in operation and if not one should be implemented.

4. Regular safety inspections should be conducted in accordance with provisions stipulated by the Commonwealth of Pennsylvania regarding the inspection of dams.



L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS AND ARCHITECTS

15 August 80
Date

R. Jeffrey Kimball, P.E.

APPROVED BY:

15 August 80
Date

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

Overview of Lake Sheridan Dam

TABLE OF CONTENTS

APPENDICES

PHASE I
NATIONAL DAM INSPECTION PROGRAM
LAKE SHERIDAN DAM
NDI. I.D. NO. PA 744
DER I.D. NO. 66-45

SECTION 1
PROJECT INFORMATION

1.1 General.

a. Authority. The National Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

b. Purpose. The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project.

a. Dam and Appurtenances. Lake Sheridan Dam is a rubble masonry and concrete gravity dam. The dam is 89 feet long and 9 feet high. The intercore of the dam consists of the original rubble masonry construction. The concrete portion of the dam was added during the 1966 modifications. The dam consists of an overflow and a non-overflow section. The downstream slope of the non-overflow section is less than .5H:1V. The majority of the downstream face of the non-overflow section is buttressed by the stream banks. The upstream slope of the concrete cap section (non overflow) of the dam is less than .5H:1V. The upstream slope of the original rubble masonry construction could not be determined. The non-overflow section of the dam is enclosed by a steel chain linked fence.

The overflow section of the dam serves as the normal spillway for the reservoir. The crest length of the spillway is 40 feet. A reservoir drain valve is located on the upstream end of the right non-overflow section. The valve controls the drainline which extends through the overflow section of the dam and outlets on the downstream face of the spillway. The type, length and diameter of the pipe could not be determined.

b. Location. The dam is located on the Lake Sheridan outlet, approximately 2 miles northeast of the village of Factoryville, Wyoming County, Pennsylvania. Lake Sheridan Dam can be located on the Factoryville, U.S.G.S. 7.5 minute quadrangle.

c. Size Classification. Lake Sheridan Dam is a small size (9 feet high, 834 ac-ft).

d. Hazard Classification. Lake Sheridan Dam is a high hazard dam. Downstream conditions indicate that loss of more than a few lives is probable should the structure fail. One home is located approximately 1/2 mile downstream of the dam. The stream which serves as the outlet for the Lake Sheridan Dam passes through the village of Factoryville where it discharges into the South Branch of the Tunkhannock Creek.

e. Ownership. Lake Sheridan Dam is owned by the Lake Sheridan Cottagers Association. Correspondence should be addressed to:

Wayne Clark, President
Lake Sheridan Cottagers Association
Box 124 R.D. 2
Nicholson, Pennsylvania 18416
(717) 945-5379

f. Purpose of Dam. Lake Sheridan Dam is used for recreation.

g. Design and Construction History. Lake Sheridan Dam has a very long and complicated history. Information obtained from the PennDER files suggest that the dam was originally constructed around 1872. Other correspondence suggest that the dam was built by subscription of the Lake Sheridan Property Owners and the Nokomis Water Company. The original owner appears to be Mr. C.A. Sisk who was listed as an administrator of the estate of S.C. Mathewson. The original construction of the dam appears to have been completed for the purpose of serving as a sawmill flow pond.

Prior to 1965 when the lake was purchased by the Lake Sheridan Cottagers Association, there appears to have been an on-going struggle between several parties as per the operation and maintenance of the dam. The owner, Mr. Sisk was somewhat reluctant to maintain the structure since it had no apparent value to him. The property owners which surround Lake Sheridan were interested in the upkeep of the dam since it affected their individual properties. The Nokomis Water Company's interest in the lake appears to have been to supply water to the residents of Factoryville. Several attempts were made to repair the dam, but in all cases it appears as though the work was minimal.

The Cottagers Association obtained ownership of Lake Sheridan in 1965. Northeastern Engineering Company Inc., Clarks Summit, Pennsylvania was retained as the engineer for the modifications to the Lake Sheridan Dam. The firm was contacted for the purposes of obtaining information for this report but a

representative of the firm was unable to supply any design information.

Review of correspondence supplied by the Pennsylvania Department of Environmental Resources indicate that the dam had a history of seepage and that the dam apparently experienced a breach in 1928. Pictures supplied by PennDER suggest that the breach was not extensive. Limited drawings which were obviously prepared by the Northeastern Engineering Company were of little value in the preparation of this report. Several notes on the drawings suggest that the original dam was to be rebuilt as per original construction and covered with a concrete cap to increase the stability of the structure. Inspection of the existing dam indicates that modifications were made to the drainline and valve control system. No information was available regarding the type of pipe, length or diameter of pipe used in the modifications, or whether the existing pipe was replaced.

h. Normal Operating Procedures. In addition to the direct runoff from the approximate two square mile drainage area of Lake Sheridan Dam, inflow to Lake Sheridan is affected by two upstream dams. Baylor's Pond appears to be a natural lake which would not affect storage or inflow to Lake Sheridan and therefore was disregarded in the analysis. Needles Lake is located below Baylor's Pond and upstream of Lake Sheridan. Its affect on Lake Sheridan is discussed in Section 5.

The association was notified of the inspection but did not send a representative. Since no personal interviews, were conducted no determination as to the operations at the dam could be made.

1.3 Pertinent Data.

a. Drainage Area.

2.0 mi^2	Uncontrolled
3.97 mi^2	Controlled
5.97 mi^2	Total

b. Discharge at Dam Site (cfs).

Maximum known flood at dam site	Unknown
Drainline capacity at normal pool	Unknown
Spillway capacity at top of dam	309 cfs

c. Elevation (U.S.G.S. Datum) (feet). - Field survey based on pool elevation 998, from U.S.G.S. 7.5 minute quadrangle.

Top of dam (non-overflow section)	999.8
Top of dam - design height	Unknown
Maximum pool - design surcharge	Unknown

Normal pool	998.0
Spillway crest	998.0
Upstream invert - drainline	Unknown
Downstream invert - drainline	Unknown
Maximum tailwater	Unknown
Toe of dam	990.6

d. Reservoir (feet).

Length of maximum pool	6000 feet
Length of normal pool	5800 feet

e. Storage (acre-feet).

Normal pool	621
Top of dam	834

f. Reservoir Surface (acres).

Top of dam	80
Normal pool	63
Spillway crest	63

g. Dam.

Type	Rubble masonry with concrete cap
Length	89 feet
Height	9 feet
Top width	7 feet
Side slopes - upstream	Less than .5H:1V
- downstream	Less than .5H:1V
Zoning	None
Impervious core	None
Cutoff	Unknown
Grout curtain	None

h. Reservoir Drain.

Type	Unknown
Length	Unknown
Closure	Gate valve
Access	Upstream (right non-overflow section)
Regulating facilities	Valve on upstream end of non-overflow section

i. Spillway.

Type	Broad crested weir
Length	40 feet
Crest elevation	998.0
Upstream channel	Lake (unrestricted)
Downstream channel	Lake Sheridan outlet

SECTION 2
ENGINEERING DATA

2.1 Design. No information exists concerning the original structure at Lake Sheridan. The dam experienced several attempts at repair although all work appears to have been minimal. In 1966 modifications were made to the dam by the Northeastern Engineering Company Inc., Clarks Summit, Pennsylvania. The firm was contacted for the purposes of obtaining information relative to the 1966 modifications but representatives of the firm advised that no information was available. Several drawings of the existing dam were made available by the Pennsylvania Department of Environmental Resources and these drawings contained remarks relative to the modifications by Northeastern Engineering Company.

2.2 Construction. No information exists on the construction of the dam.

2.3 Operation. No operations are known to be conducted at the dam.

2.4 Evaluation.

a. Availability. No engineering data is available for this dam. Various representatives of the Lake Sheridan Cottagers Association were contacted by mail but no response was received. Phone calls to various members failed to lead to any discussion with any present official of the association. No representatives of the association accompanied the inspection team on the inspection.

b. Adequacy. Detailed analyses cannot be made because of the lack of detailed design information. This Phase I Report is based on available data, visual observation and hydrologic and hydraulic analysis. Sufficient information exists to complete a Phase I Report.

SECTION 3
VISUAL INSPECTION

3.1 Findings.

a. General. The onsite inspection of Lake Sheridan Dam was conducted by personnel of L. Robert Kimball and Associates on April 10, 1980. The inspection consisted of:

1. Visual inspection of the retaining structure, abutments and toe.
2. Examination of the spillway facilities, exposed portion of any outlet works and other appurtenant works.
3. Observations affecting the runoff potential of the drainage basin.
4. Evaluation of the downstream area hazard potential.

b. Dam. The dam appears to be in fair condition. From a brief survey conducted during the inspection, it was noted that the crest of the spillway and non-overflow section appeared to be level. No major problems were noted in the non-overflow section. No cracking or leaching of the concrete was observed. The observable rubble masonry section of the dam appears to be in good condition as well as the mortared joints. Only a small portion of the masonry on the downstream slope was observable. Regulating facilities for the drain valve appeared to be in fair condition. No determination as to the condition of the drainlines could be made due to spillway discharges obstructing the downstream view of the pipe. The pipe appeared to be about 24" in diameter.

c. Appurtenant Structures. The exposed portions of the regulating facilities were observed during the inspection. The facilities appeared to be in fair condition. The reservoir drain and outlet pipes are located through the structure and close observations could not be made. These pipes or valves were not observed during the inspection and were not operated.

d. Reservoir Area. The watershed area is covered mostly with woodland. Two upstream dams exist in the Lake Sheridan watershed. The uppermost lake, Baylor's Pond appears to be a natural lake. Approximately 1/2 mile upstream of Lake Sheridan is Needles Lake dam which was constructed around 1973. The watershed and reservoir slopes are moderate to steep but do not appear to be susceptible to landslides which would affect the storage volume of the reservoir or overtopping at the dams by displacing water. The hydrologic and hyraulic consequences pertaining to the upstream dams are discussed in Section 5.

e. Downstream Channel. Approximately 2 miles downstream of Lake Sheridan, the outlet stream of Lake Sheridan joins the South Branch of the Tunkhannock Creek. The outlet for Lake Sheridan Dam joins the south branch of the Tunkhannock Creek at the village of Factoryville. One home is located approximately 1/2 mile downstream of the dam.

3.2 Evaluation. In general, the dam and appurtenant structures appear to be in fair condition.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedures. The reservoir is maintained at the spillway crest elevation 998.0. The drain valve is located on the upstream end of the dam and could be used to drain the dam. The type, length and size of the pipe could not be determined during the inspection.

4.2 Maintenance of the Dam. No information was available as per the maintenance of the dam. Attempts to locate and discuss the operation and maintenance of the dam with an officer of the Lake Sheridan Cottagers Association have been futile.

4.3 Maintenance of Operating Facilities. No information is available as per the maintenance of the spillway or outlet works. The condition of the spillway and is considered fair.

4.4 Warning System in Effect. No determination could be made as to the existance of the warning system.

4.5 Evaluation. Evaluation of the maintenance of the dam and operating facilities could not be made. Visual observations made during the inspection indicate that maintenance at the dam is fair.

SECTION 5
HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features.

a. Design Data. No calculations or design data pertaining to the hydrology and hydraulics of the dam were available.

b. Experience Data. No rainfall, runoff or reservoir level data were available. The spillway was rebuilt as part of the 1966 modifications.

c. Visual Observations. The overflow section of the spillway appears to be in fair condition.

d. Overtopping Potential. Overtopping potential was investigated through the development of the probable maximum flood (PMF) for the watershed and the subsequent routing of the PMF and fractions of the PMF through the reservoir and spillway.

The Corps of Engineers, Baltimore District, has directed that the HEC-1 Dam Safety Version systemized computer program be utilized. The program was prepared by the Hydrologic Engineering Center (HEC), U.S. Army Corps of Engineers, Davis, California, July, 1978. The major methodologies or key input data for this program are discussed briefly in Appendix D.

5.2 Evaluation Assumptions. To enable us to complete the hydraulic and hydrologic analysis for this structure, it was necessary to make the following assumptions.

1. Pool elevation prior to the storm is at spillway crest elevation 998.0.

2. The top of the non-overflow sections were considered as the top of dam.

3. Baylor's Pond, the furthermost upstream dam of the two dams, was not considered as having an effect on the inflow to Lake Sheridan.

4. Needles Lake, located approximately 1/2 mile upstream of Lake Sheridan, was considered as having failed as part of this analysis.

5.3 Summary of Overtopping Analysis. Complete summary sheets for the computer output are presented in Appendix D.

Peak inflow (PMF)	14755 cfs
Spillway capacity (Lake Sheridan)	309 cfs

a. Spillway Adequacy Rating. The Spillway Design Flood (SDF) for this dam is the 1/2 PMF to PMF. Based on the downstream potential for loss of life and property damage, the spillway design flood for this dam was selected as the PMF. The SDF is based on the hazard and size classification of the dam and the downstream potential for loss of life. Based on the following definition provided by the Corps of Engineers, the spillway is rated as inadequate as a result of our hydrologic analysis.

> Inadequate - All high hazard dams not capable of passing 50% of the spillway design flood.

The spillway and reservoir are capable of controlling approximately 2% of the PMF without overtopping the non-overflow section. A computer printout of the analysis is included in Appendix D.

Since Lake Sheridan Dam's non-overflow section consists of a concrete section over rubble masonry, the non-overflow section should be capable of safely controlling a partial overflow. However, the amount of overtopping that can be safely controlled is unknown. In this case the amount of overtopping is directly related to the structural stability of the dam.

5.4 Summary of Dam Breach Analysis. As the subject dam cannot satisfactorily pass 50% of the PMF without failure (based on our analysis) it was necessary to perform a dam breach analysis and downstream routing of the flood wave. This analysis determined the degree of increased flooding due to dam failure.

A reservoir pool elevation of 1001.0 was considered as sufficient to cause failure of Lake Sheridan Dam. This elevation represents an overtopping of 2.1 feet and it was assumed that failure would be caused by erosion at the abutments.

The flood wave was routed downstream with and without dam failure considered. The downstream potential for loss of life and property damage is not significantly increased by dam failure. Lake Sheridan's spillway is rated as inadequate, not seriously inadequate.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observations. No visible signs of instability were observed during the inspection. The observable rubble masonry section of the dam appeared to be in fair condition. No seepage was noted at the time of inspection, however water was discharging over the spillway. The concrete cap which was added as part of the 1966 modification appeared to be in good condition and no cracks were noted. Due to the lack of any structural details, no calculated stability could be determined.

The effects of overtopping of the structure on the stability are unknown since no information exists on the construction of the dam.

b. Design and Construction Data. No design data are available for this dam. No stability analysis is known to have been performed for the dam.

c. Operating Records. No operating records are known to exist.

d. Post Construction Changes. The original dam was constructed in the late 1800's. Since then and prior to 1966 several attempts had been made to upgrade the structure. It appears that the work conducted at the dam was completed to upgrade the appearance of the structure rather than improving the stability. In 1966 modifications were completed by the Northeastern Engineering Company, Clarks Summit, Pennsylvania, the construction work was completed by the M.J. Spott Construction Company, Inc. The work was initiated by the present owners, the Lake Sheridan Cottagers Association.

e. Seismic Stability. The dam is located in seismic zone 1. No seismic stability analyses has been performed. Normally, it can be considered that if a dam in this zone is stable under static loading conditions, it can be assumed safe for any expected earthquake loading. However, since the stability is questionable, the seismic stability should be assessed during the investigation recommended in Section 7.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety. The dam appears to be in fair condition. The visual observations and hydrologic and hydraulic calculations indicate that the Lake Sheridan spillway is inadequate. The spillway is capable of controlling less than 2% of the PMF without overtopping the non-overflow section of the dam. Since Lake Sheridan Dam's non-overflow section consists of a concrete section over rubble masonry, the non-overflow section should be capable of safely controlling a partial overflow. However, the amount of overtopping that can be safely controlled is unknown. In this case the amount of overtoping is directly related to the structural stability of the dam. No data are available on the design or construction of the dam. No stability analysis are known to have been performed on the dam. No visible signs of instability were noted during the inspection.

b. Adeqacy of Information. A detailed analysis of the structure cannot be made because of the lack of any design, construction information or drawings. This Phase I Report is based upon the visual observations made at the time of inspection. Sufficient information exists to complete a Phase I Report.

c. Urgency. The recommendations suggested below should be implemented immediately.

d. Necessity for Further Investigation. In order to accomplish some of the recommendations/remedial measures outlined below, further investigations will be required.

7.2 Recommendations/Remedial Measures.

1. A structural stability analysis should be conducted to determine the amount of overtopping that can be safely controlled by the dam. In the event that the dam cannot safely control the SDF a hydrologic and hydraulic study in conjunction with structure stability analysis should be conducted to increase the spillway capacity. The studies should be conducted by a professional engineer knowledgeable in dam design.

2. It should be determined if the drainline and valves are operable and in good condition. The valve mechanism for the dam should be operated and lubricated on a regular basis.

3. An investigation should be conducted to determine if a warning system for this dam is in operation; and, if not, one should be implemented.

4. Regular safety inspections should be conducted in accordance with provisions stipulated by the Commonwealth of Pennsylvania regarding the inspection of dams.

APPENDIX A
CHECKLIST, VISUAL INSPECTION, PHASE I

CHECK LIST
VISUAL INSPECTION
PHASE I

NAME OF DAM Lake Sheridan Dam COUNTY Wyoming STATE Pennsylvania ID# PA 744

TYPE OF DAM Rubble masonry concrete gravity HAZARD CATEGORY High

DATE(s) INSPECTION April 10,1980 WEATHER Clear and warm TEMPERATURE 60°

POOL ELEVATION AT TIME OF INSPECTION 998.2 M.S.L. TAILWATER AT TIME OF INSPECTION 990.7 M.S.L.

INSPECTION PERSONNEL:

R. Jeffrey Kimball, P.E. - L. Robert Kimball and Associates

James T. Hockensmith - L. Robert Kimball and Associates

O.T. McConnell - L. Robert Kimball and Associates

James T. Hockensmith
RECORDER

EMBANKMENT - Not Applicable

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS		
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE		
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES		
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST		
RIPRAP FAILURES		

EMBANKMENT - Not applicable

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
VEGETATION		
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM		
ANY NOTICEABLE SEEPAGE		
STAFF GAUGE AND RECORDER		
DRAINS		

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	None.	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Appears to be in good condition.	
DRAINS	None.	
WATER PASSAGES	40 foot overflow section, appears to be in good condition.	
FOUNDATION	Unknown.	

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	None.	
STRUCTURAL CRACKING	None noted.	
VERTICAL AND HORIZONTAL ALIGNMENT	Good.	
MONOLITH JOINTS	Good.	
CONSTRUCTION JOINTS	No visible deficiencies.	
STAFF GAUGE OR RECORDER	None.	

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	The outlet strucure was unobserved during the inspection. The outlet pipe for the reservoir drain is located on the downstream face of the overflow section and was hidden from view by discharging water. It appears as though the outlet pipe is approximately 24 inches in diameter.	
INTAKE STRUCTURE	Unobserved.	
OUTLET STRUCTURE	Not visible.	
OUTLET CHANNEL	Lake Sheridan outlet - unnamed tributary to the South Branch of the Tunkhannock Creek.	
EMERGENCY GATE	Unobserved.	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	40 foot overflow section. Appears to be in good condition.	
APPROACH CHANNEL	Lake - unrestricted.	
DISCHARGE CHANNEL	Lake Sheridan outlet.	
BRIDGE AND PIERS	None.	

GATED SPILLWAY - Not applicable

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL		
APPROACH CHANNEL		
DISCHARGE CHANNEL		
BRIDGE AND PIERS		
GATES AND OPERATION EQUIPMENT		

DOWNSTREAM CHANNEL

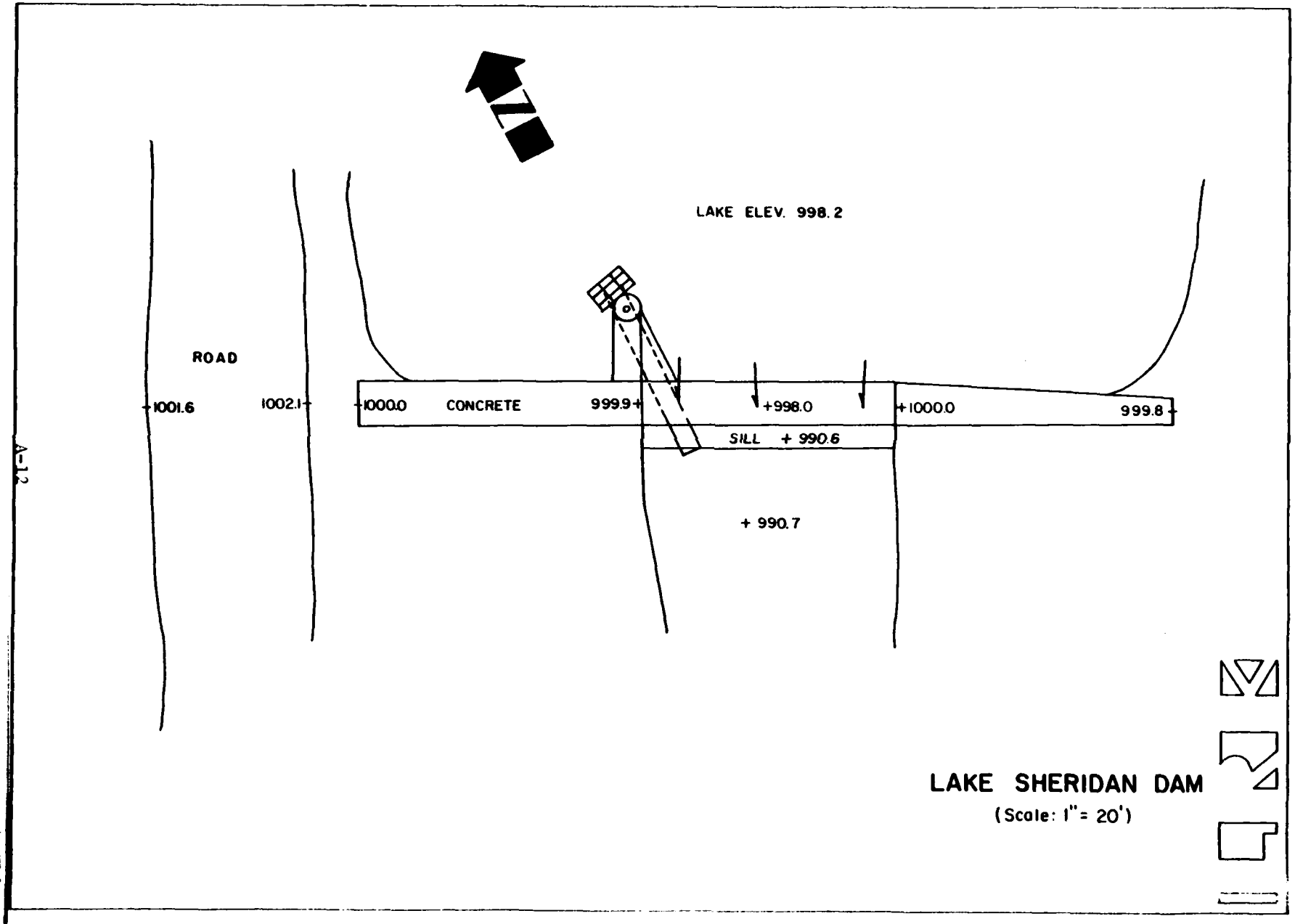
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Debris beginning to collect immediately below the overflow section of the dam.	
SLOPES	Moderate. Appear to be stable.	
APPROXIMATE NO. OF HOMES AND POPULATION	One home located approximately 1/2 mile downstream, approximately 4 people. Village of Factoryville located 2 miles downstream. Other homes located between dam and village of Factoryville.	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Moderate appear to be stable.	
SEDIMENTATION	Unknown.	

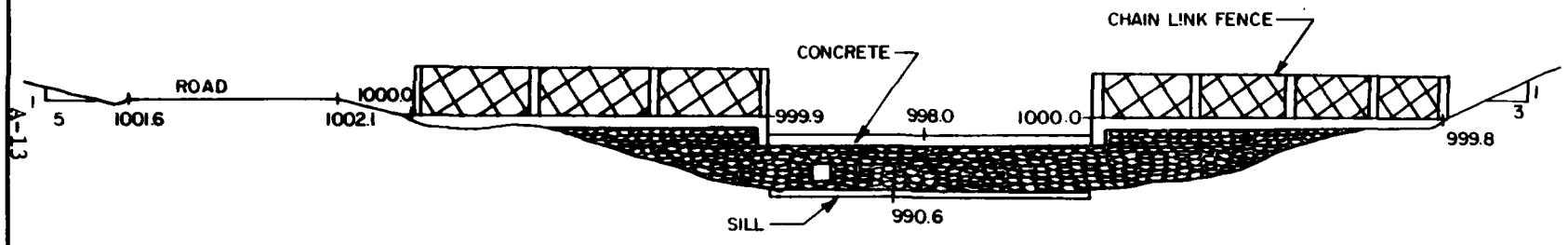
INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None.	
OBSERVATION WELLS	None.	
WEIRS	None.	
PIEZOMETERS	None.	
OTHER	None.	



LAKE SHERIDAN DAM

(Scale: 1" = 20')



PROFILE
LOOKING UPSTREAM
(Scale: 1" = 20')

LAKE SHERIDAN DAM

A-13

APPENDIX B
CHECKLIST, ENGINEERING DATA, DESIGN, CONSTRUCTION, OPERATION, PHASE I

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Lake Sheridan Dam

ID# PA 744

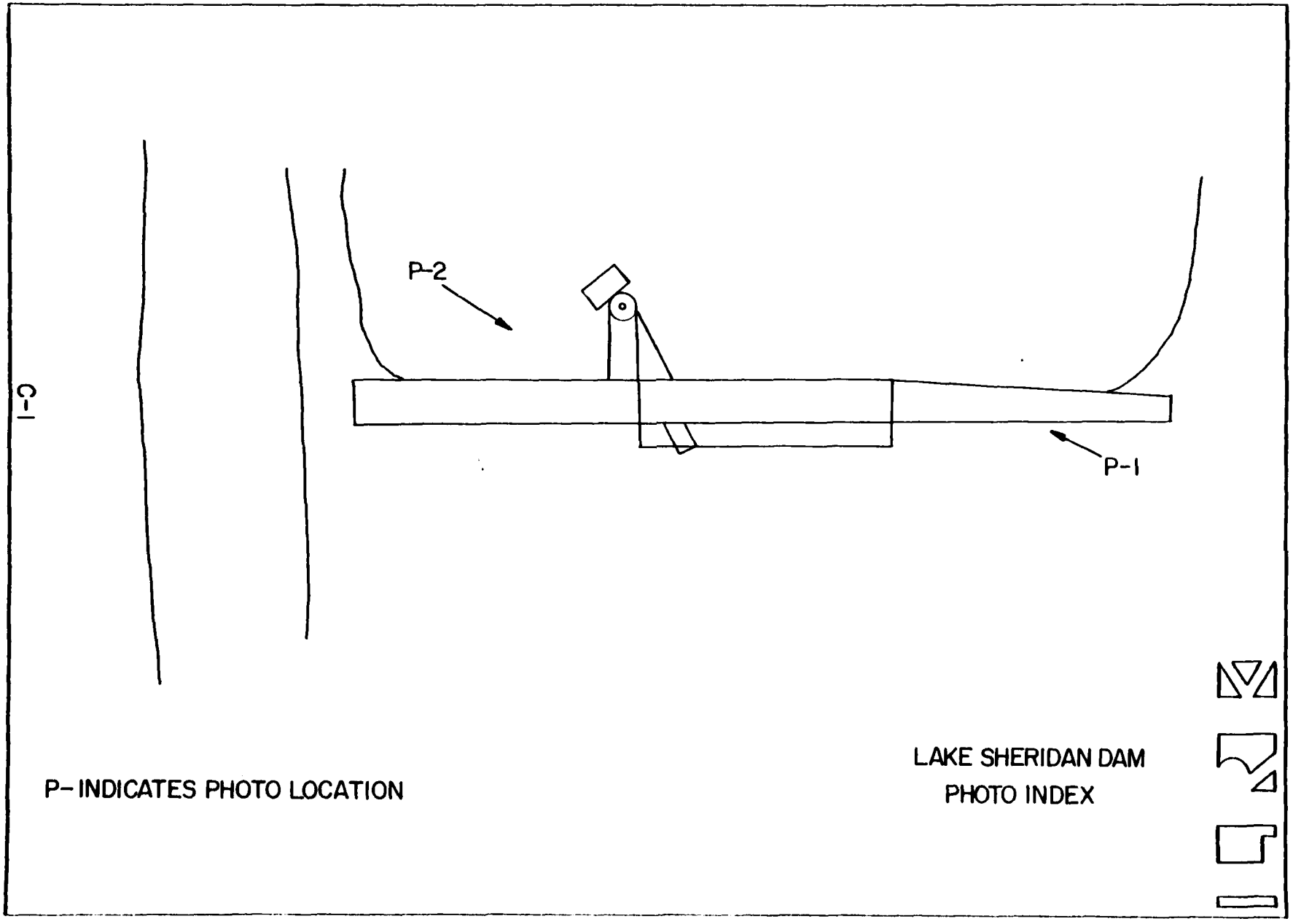
ITEM	REMARKS
AS-BUILT DRAWINGS	None.
REGIONAL VICINITY MAP	U.S.G.S. 7.5 minute quadrangle.
CONSTRUCTION HISTORY	None.
TYPICAL SECTIONS OF DAM	None.
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS RAINFALL/RESERVOIR RECORDS	None. None. None. None. None.

ITEM	REMARKS
DESIGN REPORTS	None.
GEOLOGY REPORTS	None.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Unknown.
POST-CONSTRUCTION SURVEYS OF DAM	Several undocumented prior to 1966. 1966 modifications by Northeastern Engineering Company Inc., Clarks Summit, Pennsylvania. No information available as per the 1966 modification.
BORROW SOURCES	Not applicable.

ITEM	REMARKS
MONITORING SYSTEMS	None.
MODIFICATIONS	Several minor modifications prior to 1966. 1966 modifications by Northeastern Engineering Company, Inc. Modifications appears to have included reconstruction of thr rubble masonry section of the dam and a concrete cap.
HIGH POOL RECORDS	None.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	1966 by Northeastern Engineering Company Inc.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	Minor breach in 1928, photos available in DER files.
MAINTENANCE OPERATION RECORDS	Unknown.

ITEM	REMARKS
SPILLWAY PLAN SECTIONS DETAILS	Details unknown.
OPERATING EQUIPMENT PLANS & DETAILS	Unknown.

APPENDIX C
PHOTOGRAPHS


P-2
P-1
C-1
P- INDICATES PHOTO LOCATION
LAKE SHERIDAN DAM
PHOTO INDEX

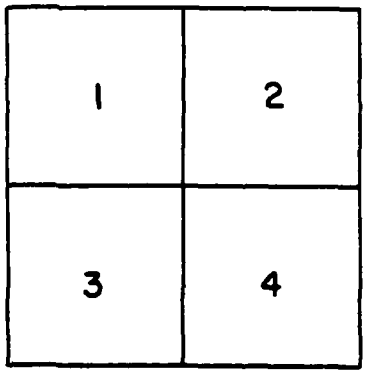
LAKE SHERIDAN DAM
PA 744

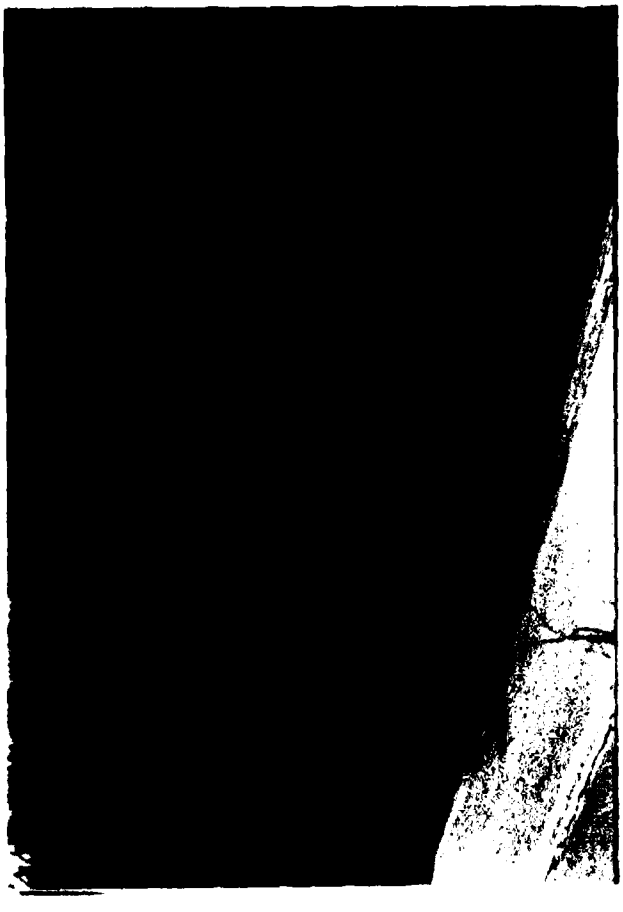
Photograph Description

Sheet 1. Front

(1) Upper left - View of structure from left abutment.
(2) Upper right - Upstream view towards right abutment.
(3) Lower left - Downstream exposure.
(4) Lower right - Middle Lake, upstream of Lake Sheridan.

TOP OF PAGE





APPENDIX D
HYDROLOGY AND HYDRAULICS

APPENDIX D
HYDROLOGY AND HYDRAULICS

Methodology. The dam overtopping and breach analyses were accomplished using the systemized computer program HEC-1 (Dam Safety Investigation), September, 1978, prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California. A brief description of the methodology used in the analysis is presented below.

1. Precipitation. The Probable Maximum Precipitation (PMP) is derived and determined from regional charts prepared from past rainfall records including "Hydrometeorological Report No. 40" prepared by the U.S. Weather Bureau.

The index rainfall is reduced from 10% to 20% depending on watershed size by utilization of what is termed the HOP Brook adjustment factor. Distribution of the total rainfall is made by the computer program using distribution methods developed by the Corps.

2. Inflow Hydrograph. The hydrologic analysis used in development of the overtopping potential is based on applying a hypothetical storm to a unit hydrograph to obtain the inflow hydrograph for reservoir routing.

The unit hydrograph is developed using the Snyder method. This method requires calculation of several key parameters. The following list gives these parameters their definition and how they were obtained for these analysis.

Parameter	Definition	Where Obtained
Ct	Coefficient representing variations of watershed	From Corps of Engineers*
L	Length of main stream channel miles	From U.S.G.S. 7.5 minute topgraphic
Lca	Length on main stream to centroid of watershed	From U.S.G.S. 7.5 minute topographic
Cp	Peaking coefficient	From Corps of Engineers*
A	Watershed size	From U.S.G.S. 7.5 minute topographic

*Developed by the Corps of Engineers on a regional basis for Pennsylvania.

3. Routing. Reservoir routing is accomplished by using Modified Plus routing techniques where the flood hydrograph is routed through reservoir storage. Hydraulic capacities of the outlet works, spillways and the crest of the dam are used as outlet controls in the routing.

The hydraulic capacity of the outlet works can either be calculated and input or sufficient dimensions input and the program will calculate an elevation discharge relationship.

Storage in the pool area is defined by an area - elevation relationship from which the computer calculates storage. Surface areas are either planimetered from available mapping or U.S.G.S. 7.5 minute series topographic maps or taken from reasonably accurate design data.

4. Dam Overtopping. Using given percentages of the PMF the computer program will calculate the percentage of the PMF which can be controlled by the reservoir and spillway without the dam overtopping.

5. Dam Breach and Downstream Routing. The computer program is equipped to determine the increase in downstream flooding due to failure of the dam caused by overtopping. This is accomplished by routing both the pre-failure peak flow and the peak flow through the breach (calculated by the computer with given input assumptions) at a given point in time and determining the water depth in the downstream channel. Channel cross-sections taken from U.S.G.S. 7.5 minute topographic maps were used in the downstream flood wave routing. Pre and post failure water depths are calculated at locations where cross-sections are input.

HYDROLOGY AND HYDRAULICS ANALYSIS
DATA BASE

NAME OF DAM: Lake Sheridan Dam

PROBABLE MAXIMUM PRECIPITATION (PMP) = 22.2 (0.96) = 21.31

STATION	1	2		3
Station Description	Baylors Pond	Needles Lake A	Needles Lake B	Lake Sheridan
Drainage Area (square miles)	2.32	0.32	1.33	2.0
Cumulative Drainage Area (square miles)	2.32	2.64	3.97	5.97
Adjustment of PMF for Drainage Area (%)(1)				
6 hours	117	117		117
12 hours	127	127		127
24 hours	136	136		136
48 hours	142	142		142
72 hours	145	145		145
Snyder Hydrograph Parameters				
Zone (2)	11	11		11
Cp (3)	0.62	0.62		0.62
Ct (3)	1.50	1.50		1.50
L (miles) (4)	2.60	0.76	2.40	2.50
Lca (miles) (4)	1.10	0.43	1.20	1.20
tp = Ct(LxLca) 0.3 hrs.	2.06	1.07	2.06	2.09
Spillway Data				
Crest Length (ft)	5	42		40
Freeboard (ft)	2	3.0		1.8
Discharge Coefficient	C'=0.95	C'=0.95		C'=0.95
Exponent	N/A	N/A		N/A

(1) Hydrometeorological Report 40 (Figure 1), U.S. Army Corps of Engineers, 1965.

(2) Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's coefficients (C_p and C_t).

(3) Snyder's Coefficients.

(4) L=Length of longest water course from outlet to basin divide. L_{ca}=Length of water course from outlet to point opposite the centroid of drainage area.

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 5.97 mi^2 wooded, moderate slopes

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 621 ac-ft

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 834 ac-ft

ELEVATION MAXIMUM DESIGN POOL: Unknown

ELEVATION TOP DAM: 999.8 - low spot

SPILLWAY CREST:

a. Elevation 998.0
b. Type Rectangular - broad crest
c. Width 40 feet - weir length
d. Length Unknown
e. Location Spillover Mid embankment - overflow section
f. Number and Type of Gates None

OUTLET WORKS:

a. Type Unknown
b. Location Through structure
c. Entrance inverts Unknown
d. Exit inverts Undeterminable
e. Emergency draindown facilities Unknown

HYDROMETEOROLOGICAL GAUGES:

a. Type None
b. Location None
c. Records None

MAXIMUM NON-DAMAGING DISCHARGE: Unknown

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EBENSBURG PENNSYLVANIA

DAM NAME LAKE SHERIDAN
I.D. NUMBER 744
SHEET NO. 1 OF 3
BY CAB DATE 5-8-80

LOSS RATE AND BASE FLOW PARAMETERS

RECOMMENDED BY THE CORPS OF ENGINEERS BALTIMORE DISTRICT.

STRTL = 1 INCH

CNSTL = .05 IN/HR

STRTQ = 1.5 CFS/MI^2

QRCSN = .05 (5% OF PEAK FLOW)

RTIOR = 2.0

ELEVATION - AREA - CAPACITY RELATIONSHIPS

FROM U.S.G.S. 7.5 MIN. QUAD., DER FILES AND FIELD INSPECTION DATA.

BAYLORS POND

NATURAL CREST ELEV. = 1135
POND SURFACE AREA = 84.5 AC
POND BOTTOM AREA = 6.4 AC.

FROM THE FORMULA FOR THE VOLUME OF A FRUSTUM OF A CONE.

$$V = \frac{h}{3}\left(A_1 + A_2 + \sqrt{A_1 A_2}\right)$$

ELEV. WHERE STORAGE EQUALS ZERO = 1100
STORAGE AT ELEV. 1135 = 1331 AC FT
STORAGE AT ELEV. 1140 = 1780 AC FT
STORAGE AT ELEV. 1160 = 5235 AC. FT

$S	0	1135	1140	1160
$E	1100	1331	1980	5235

NEEDLES LAKE (MIDDLE LAKE)

SPILLWAY CREST ELEV. = 1075
POND SURFACE AREA = 22 AC.
ELEV WHERE STORAGE EQUALS ZERO = 1065

FROM THE CONIC METHOD OF RESERVOIR STORAGE

$$V = (h)(A)/3$$

INITIAL STORAGE CAPACITY = 73 AC FT
STORAGE AT ELEV 1078 = 140 AC FT
STORAGE AT ELEV 1080 = 225 AC. FT

$S	0	73	140	225
$E	1065	1075	1078	1080

LAKE SHERIDAN

SPILLWAY CREST ELEV. = 998'
POND SURFACE AREA
UPPER PORTION = 63 AC.
LOWER PORTION = 28 AC.
POND BOTTOM AREA
UPPER PORTION = 7 AC.
LOWER PORTION = 0 AC.
POND AREA AT 1000'
UPPER PORTION = 80 AC
LOWER PORTION = 36 AC
POND AREA AT 990
UPPER PORTION = 29 AC
LOWER PORTION = 0

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EBENSBURG PENNSYLVANIA

DAM NAME LAKE SHERIDAN
I.D. NUMBER 744
SHEET NO. 3 OF 9
BY CAB DATE 5-8-80

FROM THE FORMULA FOR THE VOLUME OF A FRUSTUM OF A CONE.

$$V_4 = \frac{h}{3}\left(A_1 + A_2 + \sqrt{A_1 A_2}\right)$$

ELEV. WHERE STORAGE EQUALS ZERO = 950
STORAGE AT ELEV. 998 = 546 AC FT
STORAGE AT ELEV. 1000 = 735 AC. FT
STORAGE AT ELEV. 990 = 167 AC. FT
STORAGE AT ELEV. 1020 = 1974 AC. FT

FROM THE CONIC METHOD OF RESERVOIR STORAGE

$$V_L = (h)(A)/3$$

ELEV. WHERE STORAGE EQUALS ZERO = 990
STORAGE AT ELEV 998 = 75 AC. FT
STORAGE AT ELEV. 1000 = 120 AC. FT
STORAGE AT ELEV. 1020 = 510 AC FT

$$V_{TOTAL} = V_4 + V_L$$

$S	0	167	621	858	2484
$E	980	990	998	1000	1020

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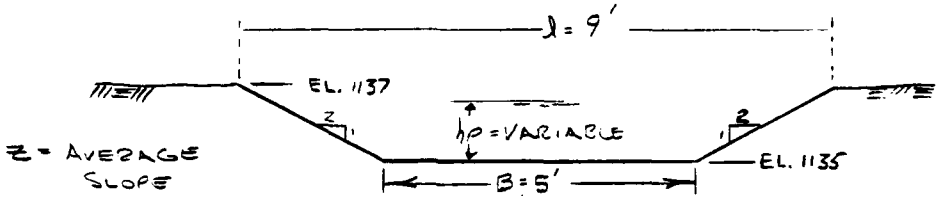
DAM NAME LAKE SHERIDAN
I.D. NUMBER 744
SHEET NO. 4 OF 9
BY CAB DATE 5-4-80

DISCHARGE RATING CURVE

BAYLORS POND

TRAPEZOIDAL CHANNEL
(NOT TO SCALE)



	TRAPEZOIDAL		WEIR		
ELEV.	h_p (ft)	Q^* (CFS)	h_p (ft)	Q^* (CFS)	Q^*_{TOTAL} (CFS)
1135.0	0	0			0
1135.5	.5	5			5
1136.0	1.0	20			20
1136.5	1.5	40			40
1137.0	2.0	65			65
1138.0			1.0	30	95
1140.0			3.0	150	215
1145.0			8.0	650	715
1150.0			13.0	1350	1415

*VALUES ROUNDED TO NEAREST 5 CFS.

TRAPEZOIDAL FLOW FROM:

$$Q = 8.03\, C' h_v^{1/2} (h_p - h_v)\left[B + Z'(h_p - h_v)\right]$$

$$h_v = \frac{3(22h_p + B) - \left(162^2 h_p^2 + 102 B h_p + 9B^2\right)^{1/2}}{102}$$

$B = 5 \qquad Z = 2 \qquad C' = .75$

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DAM NAME LAKE SHERIDAN
I.D. NUMBER 744
SHEET NO. 5 OF 9
BY CAC DATE 5-8-80

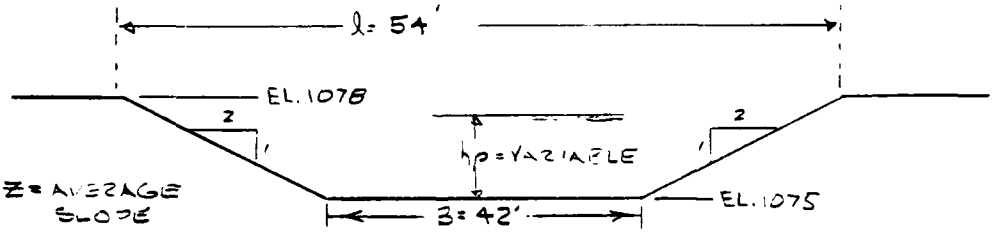
WEIR FLOW FROM:

$$Q = CLh_p^{1.5}$$

$C = 3.2 \quad L = 9.0$

SOURCE: WATER & WASTEWATER ENGINEERING
by FAIR, GEYER & OKUM 1966
NEEDLES LAKE (MIDDLE LAKE)

TRAPEZOIDAL SPILLWAY
(NOT TO SCALE)



	TRAPEZOIDAL		WEIR		
ELEV.	h_p (FT)	Q^* (CFS)	h_p (FT)	Q^* (CFS)	Q^*_{TOTAL} (CFS)
1075.0	0	0			0
1075.5	.5	45			45
1076.0	1.0	125			125
1076.5	1.5	240			240
1077.0	2.0	370			370
1077.5	2.5	525			525
1078.0	3.0	700			700
1079.0			1.0	170	870
1080.0			2.0	490	1190
1085.0			7.0	3200	3900

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DAM NAME LAKE SHERIDAN
I.D. NUMBER 744
SHEET NO. 6 OF 9
BY LAB DATE 5-8-80

*VALUES ROUNDED TO NEAREST 5 CFS

TRAPEZOIDAL FLOW FROM:

$$Q = 8.03\, C' h_v^{1/2} (h_p - h_v)\left[B + z(h_p - h_v)\right]$$

$$h_v = \frac{3(2zh_p + B) - \left(16z^2h_p^2 + 16zBh_p + 9B^2\right)^{1/2}}{10z}$$

$B = 42'$ $z = 2$ $C' = .95$ (ENTRANCE COEFF.)

WEIR FLOW FROM:

$$Q = CLh_p^{1.5}$$

$C = 3.2$ $L = 54$

SOURCE: WATER & WASTEWATER ENGINEERING
by FAIR, GEYER & OKUM 1966

LAKE SHERIDAN

DISCHARGE RATING CURVE DETERMINED BY THE HEC-1 COMPUTER PROGRAM.

SPILLWAY CREST = 998.0
SPILLWAY LENGTH = 40'
COEFFICIENT OF DISCHARGE = 3.2

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DAM NAME LAKE SHERIDAN
I.D. NUMBER 744
SHEET NO. 7 OF 9
BY CAB DATE 5-8-80

OVERTOPPING PARAMETERS

BAYLORS POND

THE NATURAL LAKE WILL BE CONSIDERED A DAM FOR THIS ANALYSIS

TOP OF DAM ELEV. = 1137
LENGTH OF DAM (EXCLUDING EXIT CHANNEL) = 10'
COEFFICIENT OF DISCHARGE = 3.0

$L	10	46	134	174	208	242
$V	1137	1138	1140	1142	1144	1146

NEEDLES LAKE (MIDDLE LAKE)

TOP OF DAM ELEV. = 1078
LENGTH OF DAM = 100'
COEFFICIENT OF DISCHARGE = 3.0

$L	100	158	216	246	286
$V	1078	1079	1080	1082	1085

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EBENSBURG PENNSYLVANIA

DAM NAME LAKE SHERIDAN
I.D. NUMBER 744
SHEET NO. 8 OF 9
BY CAJ DATE 5-6-80

LAKE SHERIDAN

TOP OF DAM ELEV. = 999.8
LENGTH OF DAM (EXCLUDING SPILLWAY) = 89'
COEFFICIENT OF DISCHARGE = 3.1

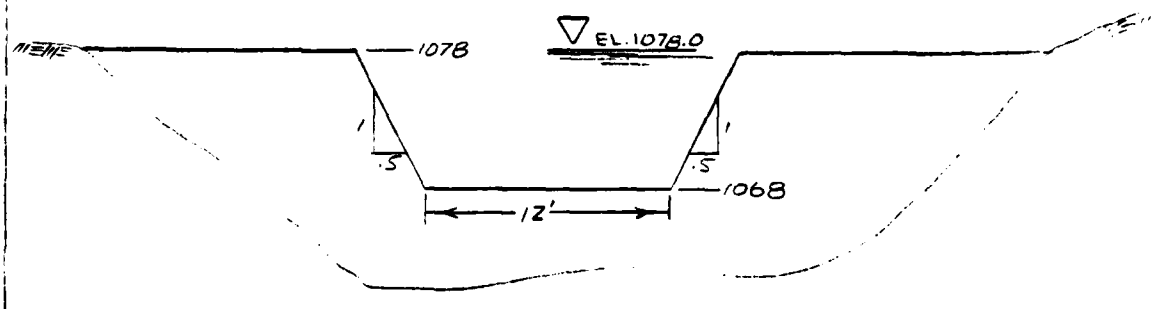
$L	2	37	89	127	137	[illegible]
$V	999.8	999.9	1000.0	1001.0	1002.0	[illegible]

DAM BREACH PARAMETERS

BAYLORS POND

WILL NOT BREACH

NEEDLES LAKE (MIDDLE LAKE)



FAILURE TIME (TFAIL) = 2.0 HR
FAILURE ELEV. (FAILEL) = 1078.0

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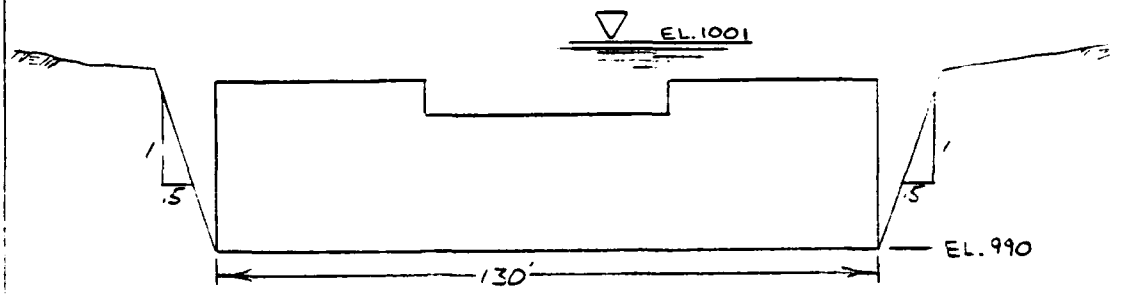
EBENSBURG PENNSYLVANIA

DAM NAME LAKE SHERIDAN
I.D. NUMBER 744
SHEET NO. 9 OF 9
BY CAR DATE 5-14-80

LAKE SHERIDAN



FAILURE TIME (TFAIL) = 5.0 HR
FAILURE ELEV. (FAILEL) = 1001

CHANNEL ROUTING

CHANNEL ROUTING CROSS SECTIONS OBTAINED FROM U.S.G.S. 7.5-MIN. QUAD.

CHANNEL MANNING'S n (QN-2) = 0.05
OVERBANK MANNING'S n (QN-1) = 0.06

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION     JULY 1978
 LAST MODIFICATION  26 FEB 79
**********
    1              A1       ANALYSIS OF DAM OVERTOPPING USING RATIOS OF PMF
    2              A2       HYDROLOGIC-HYDRAULIC ANALYSIS OF SAFETY OF THE LAKE SHERIDAN DAM
    3              A3       RATIOS OF PMF ROUTED THROUGH THE RESERVOIR (744)
    4              B   288       0       15        0        0        0        0        0        0        0
    5              B1    5
    6              J     1       5        1
    7              J1   .1      .2       .3       .4       1
    8              K     0       1                                          1
    9              K1       INFLOW TO BAYLORS POND
   10              M     1       1     2.32
   11              P           21.31     117      127      136      142      145
   12              T                                                    1.0      .05
   13              W  2.06      .62
   14              X  -1.5     -.05     2.0
   15              K     1       2                                          1
   16              K1       ROUTE THROUGH BAYLORS POND AND DOWNSTREAM
   17              Y                                    1        1
   18              Y1    1                                                -1135      -1
   19              Y4 1135.0  1136.5   1136.0   1136.5   1137.0   1138.0   1140.0   1145.0   1150.0
   20              Y5    0       5       20       40       65       95      215      715     1415
   21              SS    0    1135     1140     1160
   22              SE 1100    1331     1980     5235
   23              SS 1135
   24              SD 1137     3.0      1.5       10
   25              SL   10      46      134      174      208      242
   26              SV 1137    1138     1140     1142     1144     1146
   27              K     0       3                                          1
   28              K1       INFLOW TO MIDDLE LAKE FROM SUBAREA A
   29              M     1       1      .32
   30              P           21.31     117      127      136      142      145
   31              T                                                    1.0      .05
   32              W   .77      .62
   33              X  -1.5     -.05     2.0
   34              K     0       4                                          1
   35              K1       INFLOW TO MIDDLE LAKE FROM SUBAREA B
   36              M     1       1     1.33
   37              P           21.31     117      127      136      142      145
   38              T                                                    1.0      .05
   39              W  2.06      .62
   40              X  -1.5     -.05     2.0
   41              K     3       5                                          1
   42              K1       COMBINING THREE HYDROGRAPHS
   43              K     1       6                                          1
   44              K1       ROUTE THROUGH MIDDLE LAKE AND DOWNSTREAM
   45              Y                                    1        1
```

2/21

```
46    Y1     1                                                        -1075        -1
47    Y41075.0   1075.5   1076.0   1076.5   1077.0   1077.5   1078.0   1079.0   1080.0   1085.0
48    Y5     0       45      125      240      370      525      700      870     1190     3900
49    $S     0       73      140      225
50    $E  1065     1075     1078     1080

51    $$  1075
52    $D  1078      3.0      1.5      100
53    $L   100      158      216      246      286
54    $V  1078     1079     1080     1082     1085
55    $B    12       .5     1068      2.0     1075   1078.0
56    K      0        7                                                  1
57    KI        INFLOW TO LAKE SHERIDAN
58    M      1        1      2.0
59    P             21.31      117      127      136      142      145
60    T                                                                1.0      .05
61    W   2.09      .62
62    X   -1.5     -.05      2.0
63    K      2        8                                                  1
64    K1        COMBINING TWO HYDROGRAPHS
65    K      1        9                                                  1
66    KI        ROUTE THROUGH LAKE SHERIDAN
67    Y                                   1        1
68    Y1     1                                                        -998        0
69    $S     0      167      621      858     2484
70    $E   980      990      998     1000     1020
71    $$   998       40      3.2      1.5
72    $D 999.8      3.1      1.5       89
73    $L     2       37       89      127      131      169
74    $V 999.8    999.9   1000.0   1001.0   1002.0   1003.0
75    K     99
```

****
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79
****

RUN DATE= 80/05/12.
TIME= 06.37.19.

ANALYSIS OF DAM OVERTOPPING USING RATIOS OF PMF
HYDROLOGIC-HYDRAULIC ANALYSIS OF SAFETY OF THE LAKE SHERIDAN DAM
RATIOS OF PMF ROUTED THROUGH THE RESERVOIR (744)

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
288	0	15	0	0	0	0	0	0	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 5 LRTIO= 1

RTIOS= .10 .20 .30 .40 1.00

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SUB-AREA RUNOFF COMPUTATION

INFLOW TO BAYLORS POND

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	2.32	0.00	2.32	0.00	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.31	117.00	127.00	136.00	142.00	145.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 2.06 CP= .62 NTA= 0

RECESSION DATA
STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00
APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 9.29 AND R= 7.60 INTERVALS

UNIT HYDROGRAPH 46 END-OF-PERIOD ORDINATES, LAG= 2.05 HOURS, CP= .62 VOL= 1.00

18.	68.	138.	216.	299.	374.	428.	458.	463.	432.
382.	335.	293.	257.	225.	198.	173.	152.	133.	117.
102.	90.	78.	69.	60.	53.	46.	41.	36.	31.
27.	24.	21.	18.	16.	14.	12.	11.	10.	8.
7.	6.	6.	5.	4.	4.				

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HYDROGRAPH ROUTING

ROUTE THROUGH BAYLORS POND AND DOWNSTREAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1135.	-1

STAGE	1135.00	1135.50	1136.00	1136.50	1137.00	1138.00	1140.00	1145.00	1150.00
FLOW	0.00	5.00	20.00	40.00	65.00	95.00	215.00	715.00	1415.00

CAPACITY=	0.	1135.	1140.	1160.
ELEVATION=	1100.	1331.	1980.	5235.

CREL	SPWID	COOW	EXPW	ELEVL	COOL	CAREA	EXPL
1135.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
1137.0	3.0	1.5	10.

CREST LENGTH	10.	46.	134.	174.	208.	242.
AT OR BELOW ELEVATION	1137.0	1138.0	1140.0	1142.0	1144.0	1146.0

SUB-AREA RUNOFF COMPUTATION

INFLOW TO MIDDLE LAKE FROM SUBAREA A

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	.32	0.00	.32	0.00	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.31	117.00	127.00	136.00	142.00	145.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA

TP= .77 CP= .62 NTA= 0

RECESSION DATA

STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 3.78 AND R= 2.62 INTERVALS

UNIT HYDROGRAPH 16 END-OF-PERIOD ORDINATES, LAG= .77 HOURS, CP= .63 VOL= 1.00

25.	89.	150.	162.	128.	87.	59.	40.	27.	19.
13.	9.	6.	4.	3.	2.				

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SUB-AREA RUNOFF COMPUTATION

INFLOW TO MIDDLE LAKE FROM SUBAREA B

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
4	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	1.33	0.00	1.33	0.00	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.31	117.00	127.00	136.00	142.00	145.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 2.06 CP= .62 NTA= 0

RECESSION DATA

STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 9.29 AND R= 7.60 INTERVALS

UNIT HYDROGRAPH 46 END-OF-PERIOD ORDINATES, LAG= 2.05 HOURS, CP= .62 VOL= 1.00

11.	39.	79.	124.	171.	214.	245.	263.	265.	248.
219.	192.	168.	147.	129.	113.	99.	87.	76.	67.
59.	51.	45.	39.	35.	30.	27.	23.	20.	18.
16.	14.	12.	11.	9.	8.	7.	6.	5.	5.
4.	4.	3.	3.	2.	2.				

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HYDROGRAPH ROUTING

ROUTE THROUGH MIDDLE LAKE AND DOWNSTREAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
6	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1075.	-1

STAGE	1075.00	1075.50	1076.00	1076.50	1077.00	1077.50	1078.00	1079.00	1080.00
1085.00									
FLOW	0.00	45.00	125.00	240.00	370.00	525.00	700.00	870.00	1190.00
3900.00									

CAPACITY=	0.	73.	140.	225.
ELEVATION=	1065.	1075.	1078.	1080.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
1075.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1078.0	3.0	1.5	100.

CREST LENGTH	100.	158.	216.	246.	286.
AT OR RELOW ELEVATION	1078.0	1079.0	1080.0	1082.0	1085.0

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
12.	.50	1068.00	2.00	1075.00	1078.00

STATION 6, PLAN 1, RATIO 1

BEGIN DAM FAILURE AT 41.25 HOURS

END-OF-PERIOD HYDROGRAPH ORDINATES

OVN

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SUB-AREA RUNOFF COMPUTATION

INFLOW TO LAKE SHERIDAN

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
7	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	2.00	0.00	2.00	0.00	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.31	117.00	127.00	136.00	142.00	145.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 2.09 CP= .62 NTA= 0

RECESSION DATA

STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 9.45 AND R= 7.65 INTERVALS

UNIT HYDROGRAPH 46 END-OF-PERIOD ORDINATES, LAG= 2.07 HOURS, CP= .62 VOL= 1.00

15.	57.	115.	180.	250.	314.	361.	388.	395.	374.
333.	292.	256.	225.	197.	173.	152.	133.	117.	102.
90.	79.	69.	61.	53.	47.	41.	36.	32.	28.
24.	21.	19.	16.	14.	13.	11.	10.	9.	7.
7.	6.	5.	4.	4.	3.				

COMBINE HYDROGRAPHS

COMBINING TWO HYDROGRAPHS

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
8	2	0	0	0	0	1	0	0

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HYDROGRAPH ROUTING

ROUTE THROUGH LAKE SHERIDAN

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
9	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-998.	0

CAPACITY=	0.	167.	621.	858.	2484.
ELEVATION=	980.	990.	998.	1000.	1020.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
998.0	40.0	3.2	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
999.8	3.1	1.5	89.

CREST LENGTH	2.	37.	89.	127.	131.	169.
AT OR BELOW ELEVATION	999.8	999.9	1000.0	1001.0	1002.0	1003.0

STATION 9, PLAN 1, RATIO 1

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .10	RATIO 2 .20	RATIO 3 .30	RATIO 4 .40	RATIO 5 1.00
HYDROGRAPH AT	1	2.32	1	582.	1163.	1745.	2326.	5816.
		(6.01)		(16.47)(	32.94)(	49.40)(	65.87)(	164.68)(
ROUTED TO	2	2.32	1	580.	1162.	1745.	2327.	5818.
		(6.01)		(16.41)(	32.92)(	49.41)(	65.88)(	164.74)(
HYDROGRAPH AT	3	.32	1	131.	261.	392.	523.	1306.
		(.83)		(3.70)(	7.40)(	11.10)(	14.80)(	37.00)(
HYDROGRAPH AT	4	1.33	1	333.	667.	1000.	1334.	3334.
		(3.44)		(9.44)(	18.88)(	28.32)(	37.76)(	94.41)(
3 COMBINED	5	3.97	1	978.	1960.	2941.	3921.	9804.
		(10.28)		(27.70)(	55.49)(	83.27)(	111.03)(	277.61)(
ROUTED TO	6	3.97	1	1341.	2461.	2904.	3849.	9766.
		(10.28)		(37.99)(	69.69)(	82.23)(	108.99)(	276.53)(
HYDROGRAPH AT	7	2.00	1	499.	998.	1497.	1996.	4989.
		(5.18)		(14.13)(	28.26)(	42.38)(	56.51)(	141.28)(
2 COMBINED	8	5.97	1	1748.	3459.	4399.	5816.	14755.
		(15.46)		(49.50)(	97.95)(	124.57)(	164.70)(	417.80)(
ROUTED TO	9	5.97	1	1290.	2828.	4157.	5565.	14356.
		(15.46)		(36.53)(	80.07)(	117.72)(	157.59)(	406.51)(

SUMMARY OF DAM S TY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1135.00	1135.00	1137.00
STORAGE	172.	172.	182.
OUTFLOW	0.	0.	65.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	1139.17	2.17	192.	580.	10.25	41.75	0.00
.20	1140.08	3.08	197.	1162.	13.50	41.75	0.00
.30	1140.69	3.69	200.	1745.	17.75	41.75	0.00
.40	1141.21	4.21	202.	2327.	19.50	41.75	0.00
1.00	1143.48	6.48	214.	5818.	25.50	41.75	0.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1075.00	1075.00	1078.00
STORAGE	73.	73.	140.
OUTFLOW	0.	0.	7001.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	1078.21	.21	149.	1341.	1.38	43.25	41.25
.20	1078.70	.70	170.	2461.	2.50	41.75	39.75
.30	1078.93	.93	179.	2904.	4.75	42.00	39.00
.40	1079.64	1.64	210.	3849.	6.00	42.00	38.50
1.00	1082.28	4.28	322.	9766.	9.25	41.75	37.25

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	998.00	998.00	999.80
STORAGE	621.	621.	834.
OUTFLOW	0.	0.	309.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	1001.29	1.49	963.	1290.	8.00	43.75	0.00
.20	1002.58	2.78	1067.	2828.	11.25	42.50	0.00
.30	1003.43	3.63	1137.	4157.	13.25	42.50	0.00
.40	1004.20	4.40	1199.	5565.	14.50	42.50	0.00
1.00	1007.94	8.14	1504.	14356.	20.25	42.25	0.00

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**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION     JULY 1978
  LAST MODIFICATION  26 FEB 79
**********
    1                 A1       RATIOS OF THE PMF ROUTED THROUGH THE RESERVOIR AND DOWNSTREAM
    2                 A2       DOWNSTREAM CONDITION DUE TO OVERTOPPING OF THE LAKE SHERIDAN DAM (744)
    3                 A3       PLAN 1 ASSUMES BREACH, PLAN 2 ASSUMES NO BREACH
    4                 B   288      0      15       0       0       0       0       0       0       0
    5                 B1    5
    6                 J     2      1       1
    7                 J1   .2
    8                 K     0      1                                              1
    9                 K1       INFLOW TO BAYLORS POND
   10                 M     1      1    2.32                                                      1
   11                 P           21.31    117     127     136     142     145
   12                 T                                                  1.0    .05
   13                 W  2.06    .62
   14                 X  -1.5   -.05     2.0
   15                 K     1      2                                              1
   16                 K1       ROUTE THROUGH BAYLORS POND AND DOWNSTREAM
   17                 Y                                 1       1
   18                 Y1    1                                             -1135     -1
   19                 Y41135.0 1135.5 1136.0 1136.5 1137.0 1138.0 1140.0 1145.0 1150.0
   20                 Y5    0      5      20      40      65      95     215     715    1415
   21                 SS    0   1135    1140    1160
   22                 SE 1100   1331    1980    5235
   23                 S8 1135
   24                 SD 1137    3.0     1.5      10
   25                 SL   10     46     134     174     208     242
   26                 SV 1137   1138    1140    1142    1144    1146
   27                 K     0      3                                              1
   28                 K1       INFLOW TO MIDDLE LAKE FROM SUBAREA A
   29                 M     1      1    .32                                                       1
   30                 P           21.31    117     127     136     142     145
   31                 T                                                  1.0    .05
   32                 W   .77    .62
   33                 X  -1.5   -.05     2.0
   34                 K     0      4                                              1
   35                 K1       INFLOW TO MIDDLE LAKE FROM SUBAREA B
   36                 M     1      1    1.33                                                      1
   37                 P           21.31    117     127     136     142     145
   38                 T                                                  1.0    .05
   39                 W  2.06    .62
   40                 X  -1.5   -.05     2.0
   41                 K     3      5                                              1
   42                 K1       COMBINING THREE HYDROGRAPHS
   43                 K     1      6                                              1
   44                 K1       ROUTE THROUGH MIDDLE LAKE AND DOWNSTREAM
   45                 Y                                 1       1
   46                 Y1    1                                             -1075     -1
   47                 Y41075.0 1075.5 1076.0 1076.5 1077.0 1077.5 1078.0 1079.0 1080.0 1085.0
   48                 Y5    0     45     125     240     370     525     700     870    1190    3900
   49                 SS    0     73     140     225
   50                 SE 1065   1075    1078    1080
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```
51    SS  1075
52    SD  1078     3.0      1.5      100
53    SL   100     198      216      246      286
54    SV  1078    1079      1080     1082     1085
55    SB    12      .5      1068      2.0     1075     1078
56    K      0       7                                          1
57    K1       INFLOW TO LAKE SHERIDAN
58    M      1       1      2.0                                                  1
59    P             21.31    117      127      136      142      145
60    T                                                        1.0      .05
61    W   2.09      .62
62    X   -1.5     -.05      2.0
63    K      2       8                                          1
64    K1       COMBINING TWO HYDROGRAPHS
65    K      1       9                                          1
66    K1       ROUTE THROUGH LAKE SHERIDAN
67    Y                                 1        1
68    Y1     1                                                -998       0
69    SS     0     167      621      858     2484
70    SE   980     990      998     1000     1020
71    SS   998      40      3.2      1.5
72    SD 999.8     3.1      1.5       89
73    SL     2      37       89      127      131      169
74    SV 999.8   999.9   1000.0   1001.0   1002.0   1003.0
75    SB   130      .5      990      5.0      998     1001
76    SB   130      .5      990      5.0      998     1010
77    K      1      10                                          1
78    K1       ROUTE THROUGH STREAM
79    Y                                 1        1
80    Y1     1
81    Y6   .06     .05      .06      938      980     1750      .03
82    Y7     0     980      125      960      200      940      204      938      209      938
83    Y7   213     940      400      960      475      980
84    K     99
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**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION     JULY 1978
  LAST MODIFICATION  26 FEB 79
**********

RUN  DATE= 80/05/19.
     TIME= 12.09.10.
```

RATIOS OF THE PMF ROUTED THROUGH THE RESERVOIR AND DOWNSTREAM
DOWNSTREAM CONDITION DUE TO OVERTOPPING OF THE LAKE SHERIDAN DAM (744)
PLAN 1 ASSUMES BREACH. PLAN 2 ASSUMES NO BREACH

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
288	0	15	0	0	0	0	0	0	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 2 NRTIO= 1 LRTIO= 1

RTIOS= .20

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

INFLOW TO BAYLORS POND

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	2.32	0.00	2.32	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.31	117.00	127.00	136.00	142.00	145.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 2.06 CP= .62 NTA= 0

RECESSION DATA
STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 9.29 AND R= 7.60 INTERVALS

UNIT HYDROGRAPH 46 END-OF-PERIOD ORDINATES, LAG= 2.05 HOURS, CP= .62 VOL= 1.00

18.	68.	138.	216.	299.	374.	428.	458.	463.	432.
382.	335.	293.	257.	225.	198.	173.	152.	133.	117.
102.	90.	78.	69.	60.	53.	46.	41.	36.	31.
27.	24.	21.	18.	16.	14.	12.	11.	10.	8.
7.	6.	6.	5.	4.	4.				

HYDROGRAPH ROUTING

ROUTE THROUGH BAYLORS POND AND DOWNSTREAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1135.	-1

STAGE	1135.00	1135.50	1136.00	1136.50	1137.00	1138.00	1140.00	1145.00	1150.00
FLOW	0.00	5.00	20.00	40.00	65.00	95.00	215.00	715.00	1415.00

CAPACITY=	0.	1135.	1140.	1160.
ELEVATION=	1100.	1331.	1980.	5235.

CREL	SPWID	COQW	EXPW	ELEVL	COOL	CAREA	EXPL
1135.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
1137.0	3.0	1.5	10.

CREST LENGTH AT OR BELOW ELEVATION	10.	46.	134.	174.	208.	242.
	1137.0	1138.0	1140.0	1142.0	1144.0	1146.0

SUB-AREA RUNOFF COMPUTATION

INFLOW TO MIDDLE LAKE FROM SUBAREA A

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	.32	0.00	.32	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.31	117.00	127.00	136.00	142.00	149.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA

TP= .77 CP= .62 NTA= 0

RECESSION DATA

STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 3.78 AND R= 2.62 INTERVALS

UNIT HYDROGRAPH 16 END-OF-PERIOD ORDINATES. LAG= .77 HOURS. CP= .63 VOL= 1.00

25.	89.	150.	162.	128.	87.	59.	40.	27.	19.
13.	9.	6.	4.	3.	2.				

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

INFLOW TO MIDDLE LAKE FROM SUBAREA B

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
4	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	1.33	0.00	1.33	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.31	117.00	127.00	136.00	142.00	145.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 2.06 CP= .62 NTA= 0

RECESSION DATA

STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 9.29 AND R= 7.60 INTERVALS

UNIT HYDROGRAPH 46 END-OF-PERIOD ORDINATES, LAG= 2.05 HOURS, CP= .62 VOL= 1.00

11.	39.	79.	124.	171.	214.	245.	263.	269.	248.
219.	192.	168.	147.	129.	113.	99.	87.	76.	67.
59.	51.	45.	39.	35.	30.	27.	23.	20.	18.
16.	14.	12.	11.	9.	8.	7.	6.	5.	5.
4.	4.	3.	3.	2.	2.				

COMBINE HYDROGRAPHS

COMBINING THREE HYDROGRAPHS

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
5	3	0	0	0	0	1	0	0

HYDROGRAPH ROUTING

ROUTE THROUGH MIDDLE LAKE AND DOWNSTREAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
6	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP		LSTR
0.0	0.000	0.00	1	1	0	0		0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1075.	-1

STAGE	1075.00	1075.50	1076.00	1076.50	1077.00	1077.50	1078.00	1079.00	1080.00
1085.00									
FLOW	0.00	45.00	125.00	240.00	370.00	525.00	700.00	870.00	1190.00
3900.00									
CAPACITY=	0.	73.	140.	225.					
ELEVATION=	1065.	1075.	1078.	1080.					

CREL	SPWID	COQW	EXPW	ELEVL	COOL	CAREA	EXPL
1075.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1078.0	3.0	1.5	100.

CREST LENGTH AT OR BELOW ELEVATION	100.	158.	216.	246.	286.
	1078.0	1079.0	1080.0	1082.0	1085.0

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
12.	.50	1068.00	2.00	1075.00	1078.00

OVN

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SUB-AREA RUNOFF COMPUTATION

INFLOW TO LAKE SHERIDAN

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
7	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	2.00	0.00	2.00	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.31	117.00	127.00	136.00	142.00	145.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 2.09 CP= .62 NTA= 0

RECESSION DATA

STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 9.45 AND R= 7.65 INTERVALS

UNIT HYDROGRAPH 46 END-OF-PERIOD ORDINATES, LAG= 2.07 HOURS, CP= .62 VOL= 1.00

15.	57.	115.	180.	250.	314.	361.	388.	395.	374.
333.	292.	256.	225.	197.	173.	152.	133.	117.	102.
90.	79.	69.	61.	53.	47.	41.	36.	32.	28.
24.	21.	19.	16.	14.	13.	11.	10.	9.	7.
7.	6.	5.	4.	4.	3.				

PLAN 2 SAME AS PLAN 1

********** ********** ********** ********** **********

COMBINE HYDROGRAPHS

COMBINING TWO HYDROGRAPHS

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
8	2	0	0	0	0	1	0	0

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTE THROUGH LAKE SHERIDAN

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
9	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-998.	0

CAPACITY=	0.	167.	621.	838.	2484.
ELEVATION=	980.	990.	998.	1000.	1020.

CREL	SPWID	COOW	EXPW	ELEVL	COOL	CAREA	EXPL
998.0	60.0	3.2	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
999.8	3.1	1.5	89.

CREST LENGTH AT OR BELOW ELEVATION	2.	37.	89.	127.	131.	169.
	999.8	999.9	1000.0	1001.0	1002.0	1003.0

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
130.	.50	990.00	5.00	998.00	1001.00

HYDROGRAPH ROUTING

ROUTE THROUGH STREAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
10	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0600	.0800	.0600	938.0	980.0	1750.	.03000

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00	980.00	125.00	960.00	200.00	940.00	204.00	938.00	209.00	938.00
213.00	940.00	400.00	960.00	475.00	980.00				

STORAGE	0.00	.84	3.53	8.79	16.62	27.02	39.99	55.53	73.65
...94.23									
	117.59	143.09	170.55	199.97	231.36	264.71	300.02	337.29	376.53
...417.73									
OUTFLOW	0.00	139.73	779.87	2322.50	5113.82	9451.56	15605.64	23826.67	34350.60
.47401.68									
	63238.87	82924.92	105689.91	131611.05	160780.63	193299.22	229272.03	268806.86	312012.81
358999.55									
STAGE	938.00	940.21	942.42	944.63	946.84	949.05	951.26	953.47	955.68
...957.89									
	960.11	962.32	964.53	966.74	968.95	971.16	973.37	975.58	977.79
...980.00									
FLOW	0.00	139.73	779.87	2322.50	5113.82	9451.56	15605.64	23826.67	34350.60
347401.68									
	63238.87	82924.92	105689.91	131611.05	160780.63	193299.22	229272.03	268806.86	312012.81
358999.55									

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO 1 .20
HYDROGRAPH AT	1	2.32 (6.01)	1	1163. (32.94)(
			2	1163. (32.94)(
ROUTED TO	2	2.32 (6.01)	1	1162. (32.92)(
			2	1162. (32.92)(
HYDROGRAPH AT	3	.32 (.83)	1	261. (7.40)(
			2	261. (7.40)(
HYDROGRAPH AT	4	1.33 (3.44)	1	667. (18.88)(
			2	667. (18.88)(
3 COMBINED	5	3.97 (10.28)	1	1960. (55.49)(
			2	1960. (55.49)(
ROUTED TO	6	3.97 (10.28)	1	2461. (69.69)(
			2	2461. (69.69)(
HYDROGRAPH AT	7	2.00 (5.18)	1	998. (28.26)(
			2	998. (28.26)(
2 COMBINED	8	5.97 (15.46)	1	3459. (97.95)(

RATIOS APPLIED TO FLOWS

			2	3459.
				(97.95)(
ROUTED TO	9	5.97	1	4242.
		(15.46)		(120.12)(
			2	2828.
				(80.07)(
ROUTED TO	10	5.97	1	4242.
		(15.46)		(120.13)(
			2	2827.
				(80.05)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ••••••••••••••••

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1135.00	1135.00	1137.00
STORAGE	172.	172.	182.
OUTFLOW	0.	0.	65.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.20	1140.08	3.08	197.	1162.	13.50	41.75	0.00

PLAN 2 ••••••••••••••••

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1135.00	1135.00	1137.00
STORAGE	172.	172.	182.
OUTFLOW	0.	0.	65.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.20	1140.08	3.08	197.	1162.	13.50	41.75	0.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ••••••••••••••••

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1075.00	1075.00	1078.00
STORAGE	73.	73.	140.
OUTFLOW	0.	0.	700.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.20	1078.70	.70	170.	2461.	2.50	41.75	39.75

PLAN 2 ••••••••••••••••

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1075.00	1075.00	1078.00
STORAGE	73.	73.	140.
OUTFLOW	0.	0.	700.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.20	1078.70	.70	170.	2461.	2.50	41.75	39.75

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ••••••••••••••••

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	998.00	998.00	999.80
STORAGE	621.	621.	834.
OUTFLOW	0.	0.	309.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.20	1001.86	2.06	1010.	4243.	3.50	44.13	41.25

PLAN 2 ••••••••••••••••

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	998.00	998.00	999.80
STORAGE	621.	621.	834.
OUTFLOW	0.	0.	309.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.20	1002.58	2.78	1067.	2828.	11.25	42.50	0.00

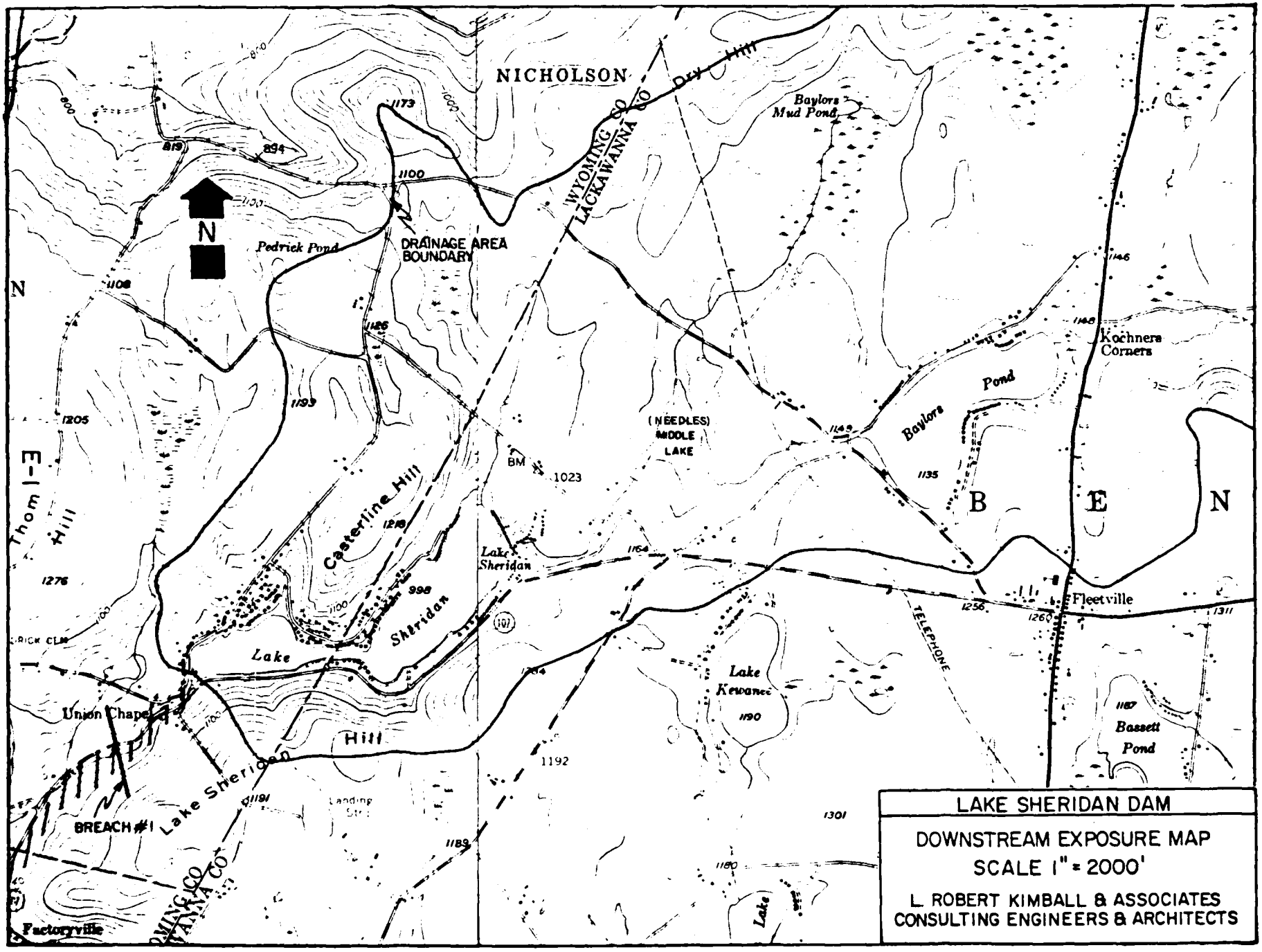
PLAN 1 STATION 10

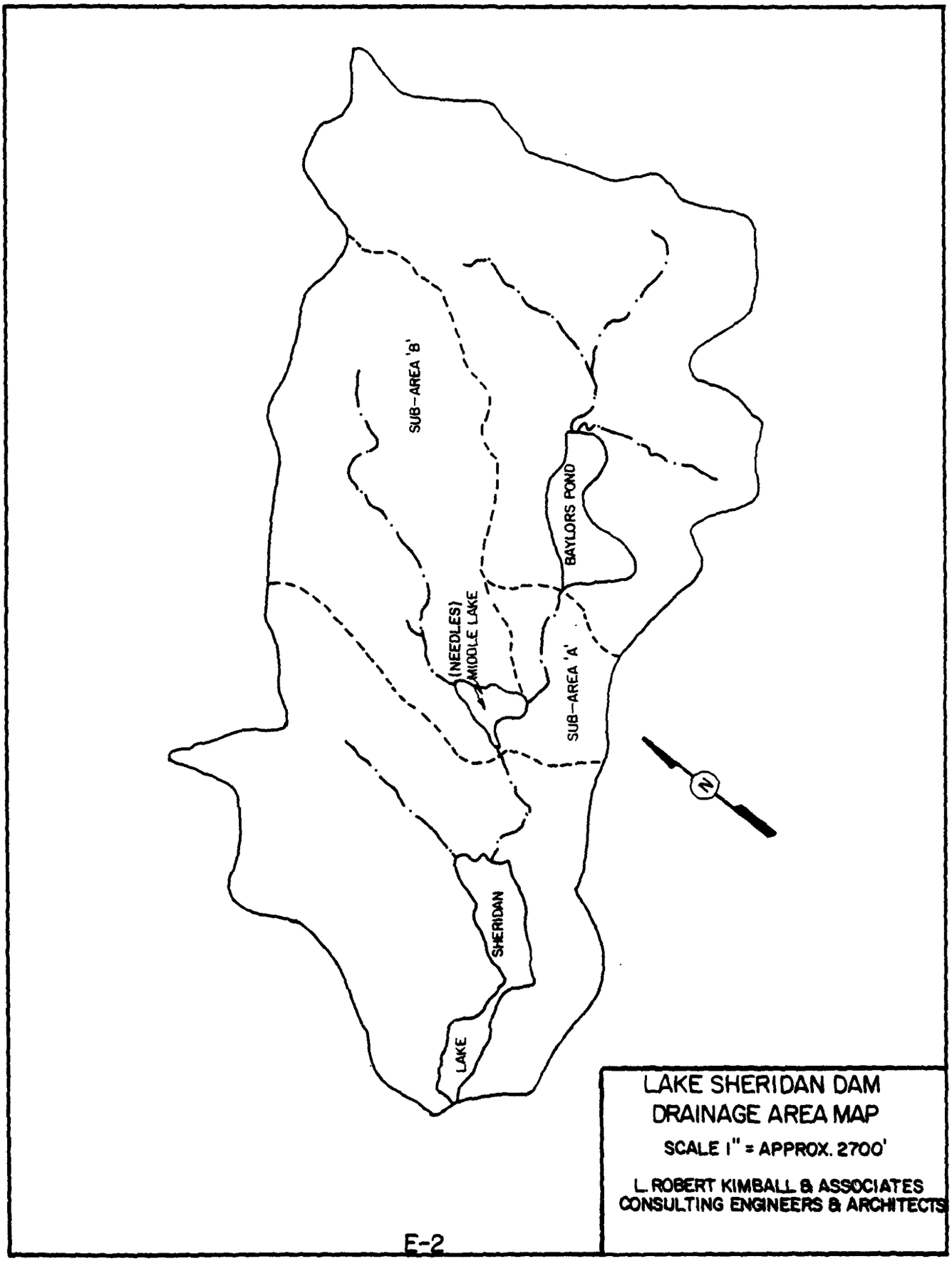
RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.20	4242.	946.2	44.00

PLAN 2 STATION 10

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.20	2827.	945.0	42.75

APPENDIX E
DRAWINGS


NICHOLSON
Baylors Mud Pond
WYOMING CO
LACKAWANNA CO
Dry
DRAINAGE AREA BOUNDARY
Pedrick Pond
N
Kochners Corners
Baylors Pond
(NEEDLES) MIDDLE LAKE
BM 1023
Casterline Hill
Lake Sheridan
Thom Hill
Fleetville
TELEPHONE
Lake Kewanee
Union Chapel
Hill
BREACH #1
Lake Sheridan
Bassett Pond
Factoryville
LAKE SHERIDAN DAM
DOWNSTREAM EXPOSURE MAP
SCALE 1" = 2000'
L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS & ARCHITECTS



LAKE SHERIDAN DAM
DRAINAGE AREA MAP

SCALE 1" = APPROX. 2700'

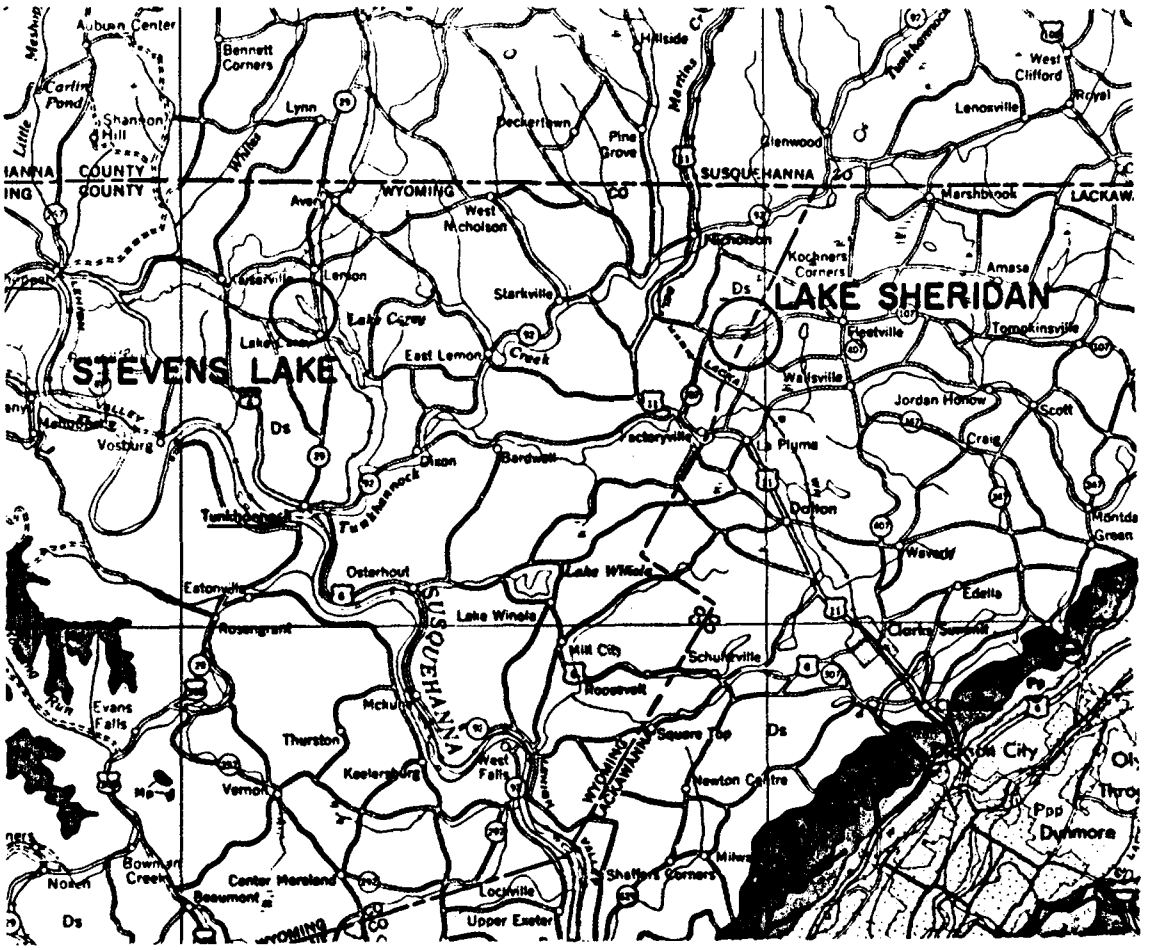
L. ROBERT KIMBALL & ASSOCIATES
CONSULTING ENGINEERS & ARCHITECTS

APPENDIX F
GEOLOGY

General Geology

Lake Sheridan lies within the (Glaciated) Low Plateaus Section of the Appalachian Plateau Physiographic Province. This area is characterized by broad anticlines and synclines and little, if any, faulting. There are no known faults in the vicinity of the dam.

The rocks underlying the lake and dam consist of the Devonian aged Susquehanna Group. This is a complex unit of conglomerate, sandstone, siltstone and shale. The usually well developed bedding ranges in thickness from less than one to over fifteen feet. The well developed joints are regular and closely spaced in the shales and siltstones. They are vertical or steeply dipping and usually form a blocky or platy pattern. The shales disintegrate rapidly, but the siltstone, sandstone and conglomerate are fairly resistant to weathering. The rocks of the Susquehanna Group form a good foundation for heavy structures if excavated to sound material and the shales and siltstones are kept waterfree. The interstitial porosity of the coarser rocks is low, but joint development has created a medium level of total effective porosity.



Geologic Map of The Area Around Stevens Lake And Lake Sheridan Dams

CENTRAL AND EASTERN PENNSYLVANIA

Oswayo Formation
Brownish and greenish gray, fine and medium grained sandstones with some shales and scattered calcareous lenses, includes red shales which become more numerous eastward. Relation to type Oswayo not proved.

Dck — **Catskill Formation**
Chiefly red to brownish shales and sandstones, includes gray and greenish sandstone tongues named Elk Mountain, Honesdale, Shohola, and Delaware River in the east

Dm — **Marine beds**
Gray to olive brown shales, graywackes, and sandstones, contains "Chemung" beds and "Portage" beds including Burket, Brallier, Harrell, and Trimmers Rock; Tully Limestone at base.

Ds — **Susquehanna Group**
Barbed line is "Chemung-Catskill" contact of Second Pennsylvania Survey County reports, barbs on "Chemung" side of line.

Scale: 1:250,000